REMARKS

General:

Claims 19-38 were pending in the application before this amendment. Claims 20, 27, and 32-33 are canceled.

Claim 19 is amended to incorporate language previously common to claims 22 and 23, and language previously common to claims 24 and 26, with consequential amendments to claims 22-26. Further amendments to claim 19 are discussed below.

Claims 21, 34, and 38 are rewritten in independent form.

Claim 37 is amended to be dependent from claim 32 instead of from canceled claim 34. Claim 29 is amended to give a more elegant dependency structure. Claim 35 is amended as discussed below.

Claims 39-42 are new. New claims 39-42 correspond to previous dependent claims 24 and 25, but made dependent from newly independent claims 21 and 38.

Claims 19, 21-26, 28-31 and 34-42 are pending in this application after this amendment.

No new matter has been added by this amendment.

Procedural status:

A Notice of Appeal from the previous final action was filed on October 7, 2005. Pursuant to 37 C.F.R. § 1.114(d), by filing the accompanying Request for Continued Examination and the present amendment and remarks, the applicant requests withdrawal of the appeal and reopening of prosecution before the examiner.

35 U.S.C. § 102:

In the office action dated April 5, 2005, claims 19-38 were rejected as anticipated by U.S. Patent No. 3,551,794 (Vander Heyden). Vander Heyden shows an NMR flowmeter for liquid flowing in a pipe 10. DC magnetization coils 12, 18 generate a constant H_0 field along the axis of the pipe. An RF injecting coil 20 applies a magnetic field across the pipe,

perpendicular to the H_0 field. The field from injecting coil 20 is an RF field at the Larmor frequency determined by the H_0 field from coils 12 and 18 on which a modulating signal from a voltage controlled oscillator 44 is superimposed (see Fig. 4b). Further downstream, an RF coil 26 produces an H_1 field at the Larmor frequency determined by the H_0 field from coil 12 that is parallel to the injection field. A pair of receiving coils 22, 24 detect the induced voltage caused by magnetized nuclei rotating in the H_1 field.

The examiner alleges that the receiving coils 22, 24 "generate a second magnetic field" but that is not correct: Figs. 1, 5, and 6 clearly show that the only signal line connected to the coils 22, 24 leads from the coils to the *input* of an amplifier 46. The receiving coils 22, 24 serve solely to detect the field produced by the precession of the tagged nuclei in the H_1 field, see col. 4, lines 50-55.

The modulating signal from the receiving coils 22, 24 is compared with that from the VCO 44 in phase detector 50, and an error signal is fed back to control VCO 44 so that the modulating signal at the receiving coils 22, 24 is always 90° behind the modulating signal injected by the coil 20. (Since the distance between the coils 20 and 22, 24 is known, the frequency of the modulating signal then becomes a proxy for the flow speed of the fluid.) Vander Heyden at col. 5, line 29-30 relates the frequency ω/Π of the feedback signal to the output of the R.F. generator 27, but that is contradicted by col. 5, lines 66-69, which identifies $\Theta=\Pi/2$ with the period of the VCO 44. The latter is clearly correct: the detector and limiter 48 discards the R.F. carrier and reduces the modulated signal to its envelope, which the phase detector 50 compares to the output of the VCO 44.

As a preliminary matter, the examiner is respectfully reminded that "to anticipate a claim, the reference must teach every element of the claim." MPEP § 2131, headline to commentary. A comparison of the language of claims 19, 21, 34, and 38 with the examiner's stated ground of rejection reveals that each of claims 19, 21, 34, and 38 recites features that the examiner has not alleged to be present in Vander Heyden (and that are not present in Vander Heyden). The examiner's rejection of claims 19, 21, 34, and 38 and claims dependent therefrom under 35 U.S.C. §102 is traversed on the ground that no valid ground of rejection has been stated.

Claim 19 has been amended to recite that the first and second coil currents are both time-varying currents generated by a coil or pair of coils. (Basis for this feature is found at least in Figs. 1 and 8 and the associated text. Basis for time-varying currents that are not necessarily sinusoidal is found at least in "any other law which is repetitive or not" at page 11, lines 12-13.) There is no disclosure or suggestion of that feature in Vander Heyden. It is respectfully pointed out that the current to the first coil 12, 18 in Vander Heyden is a DC current, not a time-varying current. Varying the intensity of the current supplied to the first coils 12, 18 would be contrary to the teaching of the reference, because Vander Heyden relies on the constant field from the coils 12, 18 to set the Larmor frequencies for the coils 20, 26.

Claim 19 has been further amended to recite that the field plane (which is defined by the magnetic fields from the first and second coils or pairs of coils, and in which the composite field vector H moves) is not parallel to the pipe in which the liquid flows. Basis for this feature is found at least at page 12, lines 18-31, which describes that a maximum angle of inclination of the field plane of 45° is reasonable, but not essential. The preferred case of a field plane inclined at 90° to 45° is already claimed in claim 25. There is no disclosure or suggestion in Vander Heyden that the H_0 field from the first coil 12, 18, and the H_0 field generated by that coil, could be in any position other than along the axis of the pipe.

Claim 19 is further amended to recite that the angle θ between the component fields is greater than 0 and less than 180°. This amendment does not affect the scope of the claim, because θ exactly equal to 0 or 180° was already excluded by the requirement that the resultant field vector have a displacement velocity V not parallel to the field H, but is believed to make the claim easier to read.

Claim 22 further recites that the sinusoidal first and second coil currents are currents of the same frequency, shifted in phase by 90°. There is no disclosure or suggestion of that feature in Vander Heyden. It is respectfully pointed out that the current to the first coil 12, 18 in Vander Heyden is a DC current and does not have a frequency. Certainly it cannot have the same frequency as the injecting coil 20 or the H_1 coil 26. Further, there is no disclosure or suggestion in Vander Heyden of any two coils being excited by currents

shifted in phase by 90°. The 90° phase shift is between the exciting current fed to the injecting coil 20 and the signal *received from* the detector coils 22, 24 (all of which coils the examiner identifies as second coils). Still further, the phase shift does not affect the actual sinusoidal current to and from the coils, but only the modulating signal superimposed on the sinusoidal current.

Claim 23 further recites that the sinusoidal currents applied to the first and second coils are currents of the same amplitude but different frequencies. There is no disclosure or suggestion of that feature in Vander Heyden. It is respectfully pointed out that the current to the first coil 12, 18 in Vander Heyden is a DC current, not a sinusoidal current, and does not have a frequency.

Claim 21 recites the step of varying the intensities and frequencies of the currents supplied to the first and second coils over time independently of one another. There is no disclosure or suggestion of that feature in Vander Heyden. In particular, there is no disclosure or suggestion in Vander Heyden that the current supplied to the first coils 12, 18 varies at all, so that current cannot be described as varying independently of anything else. Further, it would not be obvious to vary either the intensity or the frequency of the current supplied to the first coils 12, 18. Varying the intensity of the current supplied to the first coils 12, 18 would be contrary to the teaching of the reference, because Vander Heyden relies on the constant field from the coils 12, 18 to set the Larmor frequencies for the coils 20, 26. A DC current of constant intensity has no frequency to vary.

Claim 34 recites the step of varying the intensities or frequencies of the currents supplied to the first and second coils over time independently of one another. There is no disclosure or suggestion of that feature in Vander Heyden. In particular, there is no disclosure or suggestion in Vander Heyden that the current supplied to the first coils 12, 18 varies at all, so that current cannot be described as varying independently of anything else. Further, it would not be obvious to vary either the intensity or the frequency of the current supplied to the first coils 12, 18. Varying the intensity of the current supplied to the first coils 12, 18 would be contrary to the teaching of the reference, because Vander Heyden relies on the constant field from the coils 12, 18 to set the Larmor frequencies for the coils 20, 26. A DC current of constant intensity has no frequency to vary.

Claim 35 has been amended to specify that the two periodic currents of the same frequency are applied with a phase difference φ that is greater than zero but less than 180°. Basis for this feature is found at page 10, lines 25-27 and 30-31, and in the fact that, with the preferred sinusoidal waveform, $\varphi = 0$ or $\varphi = 180°$ does not produce the recited angular sweep velocity V. Claim 35 is deemed to be novel and non-obvious over Vander Heyden for at least the same reasons set out above with reference to claim 22.

Claim 38 recites that the first and second fields are oblique to one another. There is no disclosure or suggestion of that feature in Vander Heyden. In Vander Heyden's device, all of the fields are parallel or orthogonal to one another. See, for example, col. 3, lines 56-61, col. 4, lines 63-64, col. 6, lines 72-74, col. 7, lines 1-2, col. 10, lines 38-43. Vander Heyden explains that the orthogonal arrangement is important to avoid cross-talk and interference between the different coils, and thus teaches away from any oblique arrangement.

There is nothing that could have suggested to a person of ordinary skill in the art to modify Vander Heyden's flowmeter so as to provide the features of the present invention as claimed. Vander Heyden's whole system is based on a large, fixed axial H_0 field generated by DC coils 12, 18, and very much smaller orthogonal fields from injecting coil 20 and H_1 field coil 26. Those features necessarily give a small magnetic field displacement velocity vector, and no real interaction between the superimposed fields. The present invention, in contrast, permits a method in which V, and consequently V^H, is large and rapidly varying. The large value of V^H enables substantial stereochemical deformations, and the large variation in V^H permits the stereochemical deformations to be achieved when the optimum value for a specific target molecule or reaction is not accurately known.

For all of the above reasons, the present invention, as claimed in claims 19, 21-23, 34, 35, and 38, is believed to be both new and non-obvious over Vander Heyden.

Without prejudice to their individual merits, claims 24-26, 28-31, 36, 37, and 39-42 are believed to be allowable as claims dependent from an allowable base claim.

Conclusion:

In view of the foregoing, reconsideration of the examiner's rejections and allowance of claim claims 19, 21-26, 28-31, and 34-42 is earnestly solicited.

Respectfully submitted

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